CLAIMS

We claim:

1. A method for synchronizing a TTR clock during a Channel Discovery Phase of a DSL service initialization operating in a TCM-ISDN noise environment, the method comprising:

transmitting a C-COMB signal to a customer premises DSL transceiver during the Channel Discovery Phase, the C-COMB signal including a TTR indication portion allowing the customer premises DSL transceiver to synchronize a TTR clock; and

during a quiet period of the Channel Discovery Phase, transmitting a TTR indication signal to the customer premises DSL transceiver to maintain synchronization of the transceiver's TTR clock.

2. The method of claim 1, wherein the TTR indication signal comprises at least one hyperframe that includes:

a first set of symbols for indicating the hyperframe boundary; and

a second set of symbols having no signal for allowing quiet noise measurement.

3. The method of claim 2, wherein the first set of symbols includes the first continuous group of symbols of the hyperframe dominated by far-end crosstalk interference.

4. The method of claim 3, wherein the TTR indication signal comprises a COMB or inverted COMB signal transmitted during each of the first set of symbols.

5. The method of claim 3, wherein the TTR indication signal comprises a REVERB signal transmitted during the first set of symbols.

6. The method of claim 5, wherein the REVERB signal includes a range of sub-carriers selected in a frequency range low enough to avoid being attenuated when transmitted to the customer premises DSL transceiver.

7. The method of claim 2, further comprising:

measuring at least one quiet noise parameter during the second set of symbols.

8. The method of claim 7, wherein the measured quiet noise parameter is quiet noise level per bin.

9. The method of claim 7, wherein the measuring at least one quiet noise parameter is performed for symbols in the presence of far-end crosstalk or near-end crosstalk.

10. A method for maintaining TTR synchronization in a customer premises DSL transceiver during a Channel Discovery Phase of a DSL service initialization operating in a TCM-ISDN noise environment, the method comprising:

receiving a TTR indication signal from a central office DSL transceiver, the TTR indication signal comprising at least one hyperframe that includes a plurality of symbols, some of which contain no signal from the central office DSL transceiver;

using at least a portion of the TTR indication signal to synchronize a local TTR clock thereto; and

measuring a quiet noise parameter during symbols of the hyperframe in which no signal is received from the central office DSL transceiver.

11. The method of claim 10, wherein the TTR indication signal comprises at least one hyperframe that includes:

a first set of symbols for indicating the hyperframe boundary; and

a second set of symbols having no signal for allowing quiet noise measurement.

12. The method of claim 11, wherein the first set of symbols includes the first continuous group of symbols of the hyperframe dominated by far-end crosstalk interference.

13. The method of claim 12, wherein the TTR indication signal comprises a COMB or inverted COMB signal transmitted during each of the first set of symbols.

14. The method of claim 12, wherein the TTR indication signal comprises a REVERB signal transmitted during the first set of symbols.

15. The method of claim 14, wherein the REVERB signal includes a range of sub-carriers selected in a frequency range low enough to avoid being attenuated when transmitted to the customer premises DSL transceiver.

16. The method of claim 11, further comprising:

measuring at least one quiet noise parameter during the second set of symbols.

17. The method of claim 16, wherein the measured quiet noise parameter is quiet noise level per bin.

18. The method of claim 16, wherein the measuring at least one quiet noise parameter is performed for symbols in the presence of far-end crosstalk or near-end crosstalk.

19. A central office DSL transceiver for maintaining synchronization of a customer premises TTR clock during a Channel Discovery Phase of a DSL service

initialization operating in a TCM-ISDN noise environment, the transceiver configured to perform the operations:

transmitting a C-COMB signal to a customer premises DSL transceiver during the Channel Discovery Phase, the C-COMB signal including a TTR indication portion allowing the customer premises DSL transceiver to synchronize a TTR clock; and

during a quiet period of the Channel Discovery Phase, transmitting a TTR indication signal to the customer premises DSL transceiver to maintain synchronization of the transceiver's TTR clock.

20. The transceiver of claim 19, wherein the TTR indication signal comprises at least one hyperframe that includes:

a first set of symbols for indicating the hyperframe boundary; and

a second set of symbols having no signal for allowing quiet noise measurement.

21. The transceiver of claim 20 wherein the first set of symbols includes the first continuous group of symbols of the hyperframe dominated by far-end crosstalk interference.

22. The transceiver of claim 21, wherein the TTR indication signal comprises a COMB or inverted COMB signal transmitted during each of the first set of symbols.

23. The transceiver of claim 21, wherein the TTR indication signal comprises a REVERB signal transmitted during the first set of symbols.

24. The transceiver of claim 23, wherein the REVERB signal includes a range of sub-carriers selected in a frequency range low enough to avoid being attenuated when transmitted to the customer premises DSL transceiver.

25. The transceiver of claim 20, the transceiver further configured to perform the operation:

measuring at least one quiet noise parameter during the second set of symbols.

26. The transceiver of claim 25, wherein the measured quiet noise parameter is quiet noise level per bin.

27. The transceiver of claim 25, wherein the measuring at least one quiet noise parameter is performed for symbols in the presence of far-end crosstalk or near-end crosstalk.